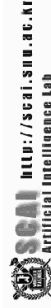


An Introduction to Intelligent Agents

Byoung-Tak Zhang

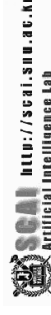
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Outline

- ◆ What are Intelligent Agents ?
- ◆ Properties of Intelligent Agents
- ◆ Taxonomy of Intelligent Agents
- ◆ Differences from Other Software
- ◆ Reasons for Using Intelligent Agents
- ◆ Applications of Intelligent Agents
- ◆ Learning Methods for Agents



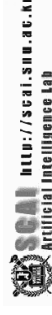
What are Intelligent Agents ?

- ◆ Some Definitions of Intelligent Agents
 - “Intelligent agents continuously perform three functions: perception of dynamic conditions in the environment; action to affect conditions in the environment; and reasoning to interpret perceptions, solve problems, draw inferences, and determine actions” [Hayes-Roth, 1995].



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- “An autonomous agent is a system situated within and a part of an environment that senses that environment and acts on it, over time, in pursuit of its own agenda and so as to effect what it senses in the future” [Franklin and Graesser, 1995].
- “A hardware or (more usually) software-based computer system that enjoys the following properties: autonomy, social ability, reactivity, pro-activeness” [Wooldridge and Jennings, 1995].

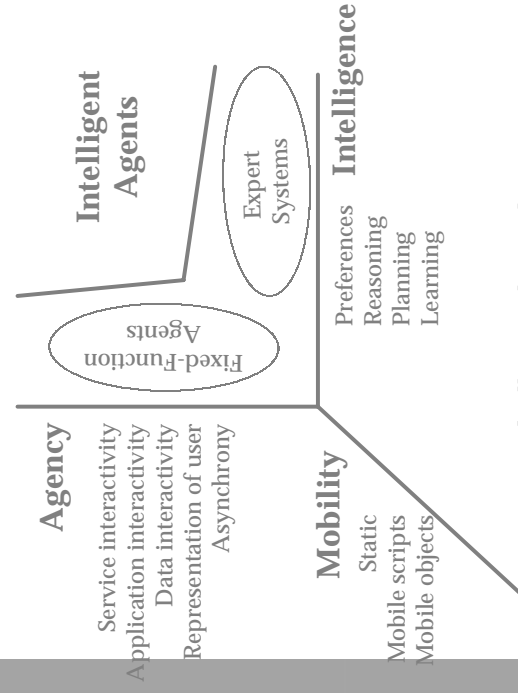


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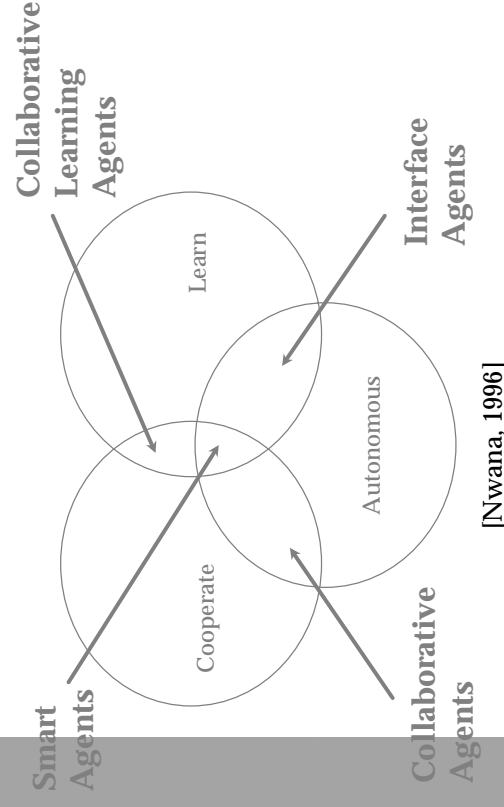
- “Autonomous agents are computational systems that inhabit some complex dynamic environment, sense and act autonomously in this environment, and by doing so realize a set of goals or tasks for which they are designed” [Maes, 1995].
- “Intelligent agents are software entities that carry out some set of operations on behalf of a user or another program with some degree of independence or autonomy, and in so doing, employ some knowledge or representation of the user’s goals or desires” [IBM].

Properties of Intelligent Agents

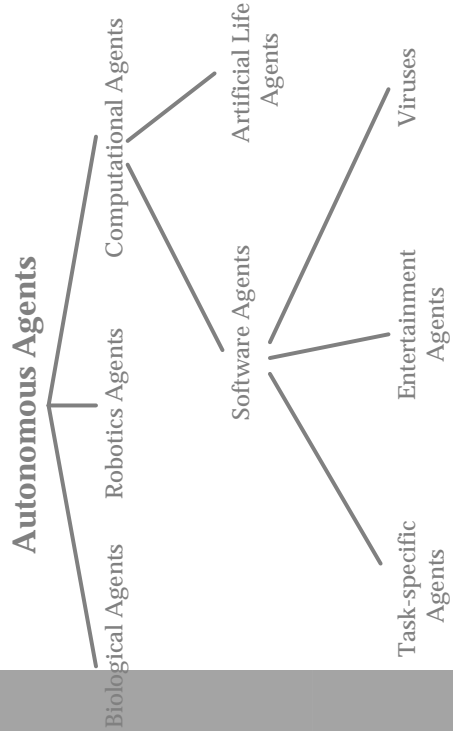
- Reactivity
- Autonomy
- Inferential capability
- Temporal continuity
- Personality
- Adaptivity
- Learnability
- Collaborative behavior
- Communication ability
- Mobility



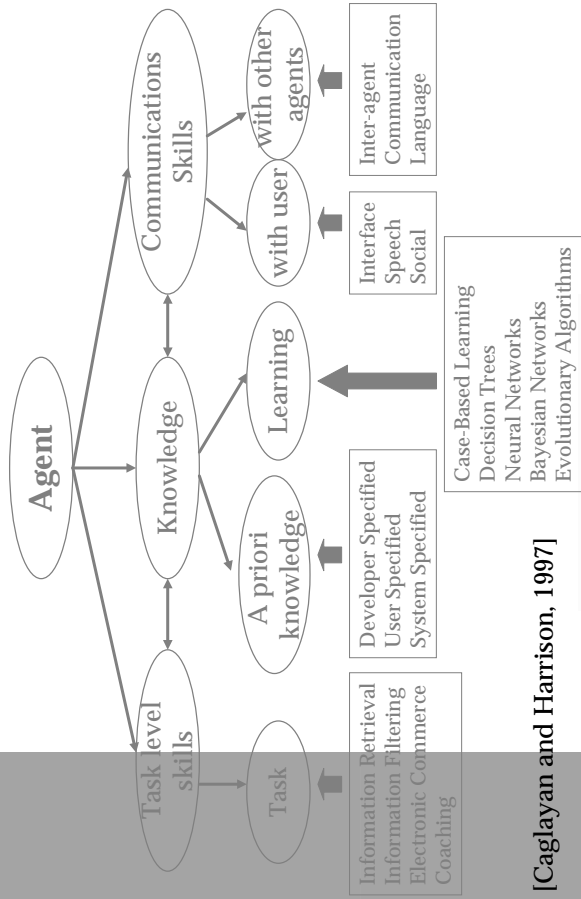
[Gilbert et al., 1995]



[Nwana, 1996]



[Franklin and Graesser, 1996]



[Caglayan and Harrison, 1997]

Differences from other Software

- ◆ How is an Agent different from other Software?
 - personalized, customized
 - pro-active, takes initiative
 - long-lived, autonomous
 - adaptive

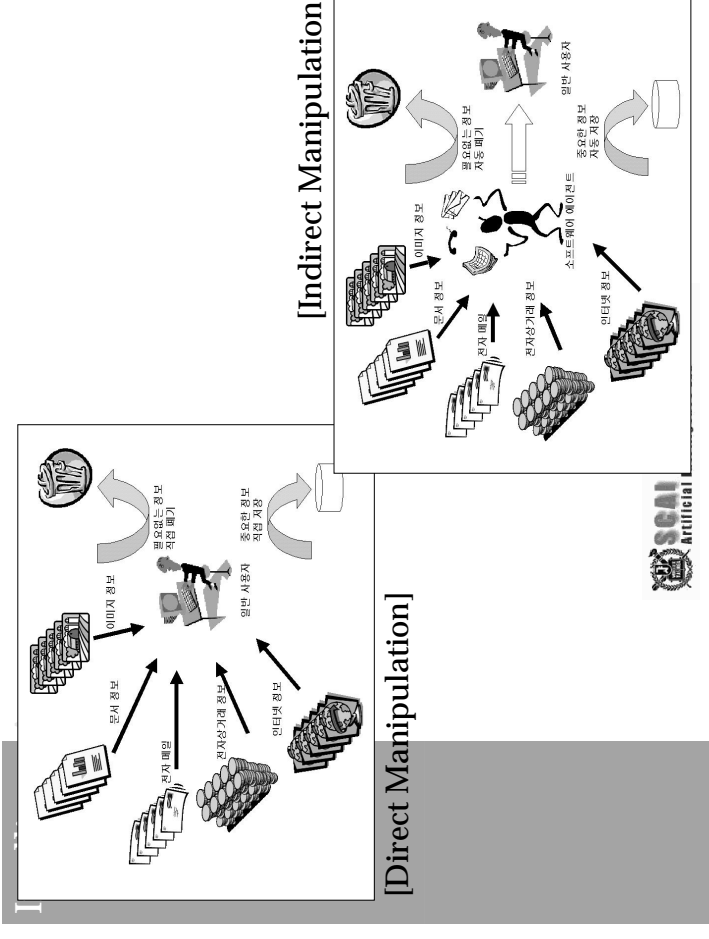
◆ Software Agents vs. Expert Systems

	Software Agents	Expert Systems
Level of users	naïve	expert
Tasks	common	high-level task
Personalized	different actions	same actions
Active, autonomous	on their own	passively
Adaptive	learn and change	remain fixed

[Maes, 1997]

Reasons for Using Intelligent Agents

- ◆ Why do we need Software Agents?
 - more everyday tasks are computer-based
 - vast amounts of dynamic, unstructured information
 - more users, untrained
- ◆ Change of Metaphor for HCI
 - Direct manipulation
 - Indirect manipulation



Applications of Intelligent Agents

- E-mail Agents
 - Beyond Mail, Lotus Notes, Maxims
- Scheduling Agents
 - ContactFinder
- Desktop Agents
 - Office 2000 Help, Open Sesame
- Web-Browsing Assistants
 - WebWatcher, Letizia

- Information Filtering Agents
 - Amalthaea, Jester, InfoFinder, Remembrance agent, PHOAKS, SiteSeer
- News-service Agents
 - NewsHound, GroupLens, FireFly, Fab, ReferralWeb, NewT
- Comparison Shopping Agents
 - MySimon, BargainFinder, Bazzar, ShopBot, Fido
- Brokering Agents
 - PersonalLogic, Barnes, Kasbah, Jango, Yenta

- Auction Agents
 - AuctionBot, AuctionWeb
- Negotiation Agents
 - DataDetectors, T@T

Learning Methods for Agents

- ◆ Learning agents: “Agents that change its behavior based on its previous experience.”
- ◆ Learning Methods
 - Decision Trees
 - e.g.) InfoFinder
 - Bayesian Learning
 - e.g.) Syskill & Webert, NewsHound

- Neural Networks
 - Neural Networks
 - e.g.) Chaplin, STEALTH, Intruder Alert
- Reinforcement Learning
 - e.g.) WAIR, LASER
- Evolutionary Algorithms
 - e.g.) PAWS, ARACHNID